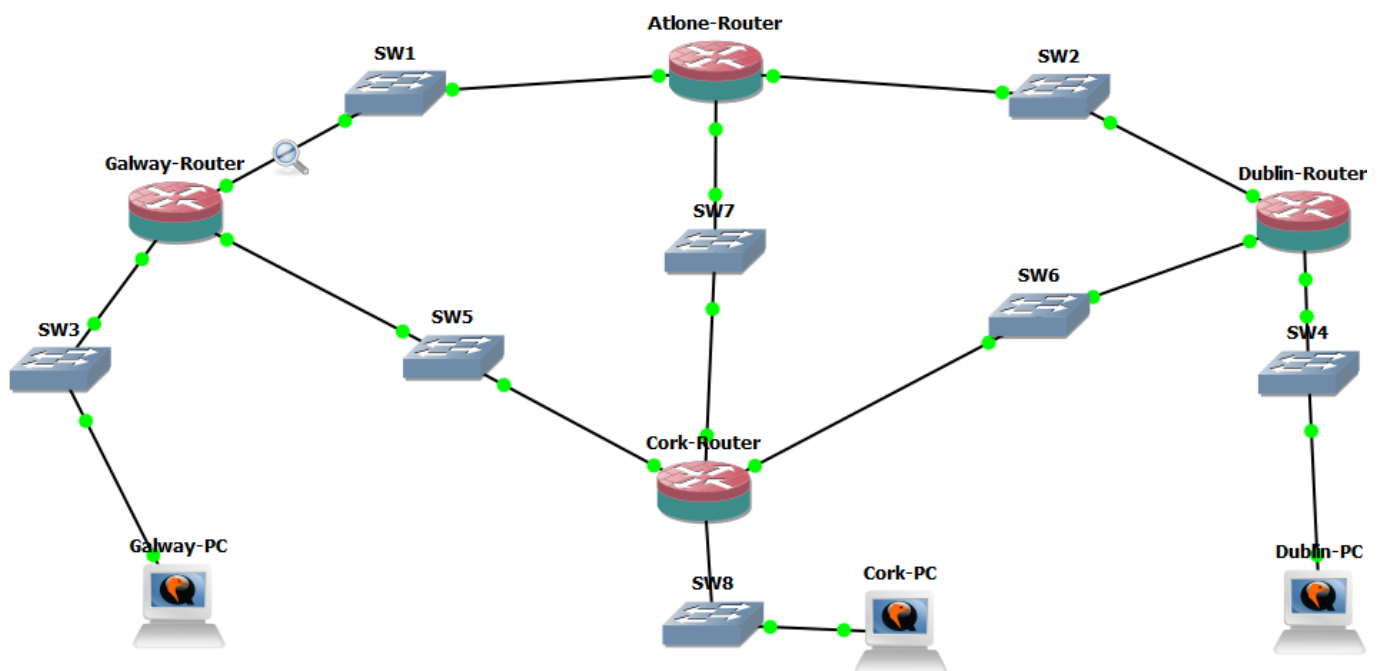


Seán Reilly

14336256

13/11/2016

CT3531 OSPF Network Simulation Assignment



1. Ping & Traceroute

Galway -> Dublin (ping)

Machine	View
<pre>tc@box:~\$ sudo su root@box:~# ping 192.168.2.1 PING 192.168.2.1 (192.168.2.1): 56 data bytes 64 bytes from 192.168.2.1: seq=0 ttl=62 time=467.533 ms 64 bytes from 192.168.2.1: seq=1 ttl=62 time=159.264 ms 64 bytes from 192.168.2.1: seq=2 ttl=62 time=162.221 ms ^C --- 192.168.2.1 ping statistics --- 3 packets transmitted, 3 packets received, 0% packet loss round-trip min/avg/max = 159.264/263.006/467.533 ms root@box:~#</pre>	

Galway -> Cork (ping)

Machine	View
<pre>tc@box:~\$ sudo su root@box:~# ping 192.168.2.1 PING 192.168.2.1 (192.168.2.1): 56 data bytes 64 bytes from 192.168.2.1: seq=0 ttl=62 time=467.533 ms 64 bytes from 192.168.2.1: seq=1 ttl=62 time=159.264 ms 64 bytes from 192.168.2.1: seq=2 ttl=62 time=162.221 ms ^C --- 192.168.2.1 ping statistics --- 3 packets transmitted, 3 packets received, 0% packet loss round-trip min/avg/max = 159.264/263.006/467.533 ms root@box:~#</pre>	

Traceroute:

Galway -> Cork

```
root@box:~# traceroute 192.168.3.254
traceroute to 192.168.3.254 (192.168.3.254), 30 hops max, 38 byte packets
 1  192.168.1.1 (192.168.1.1)  18.526 ms  37.138 ms  1.410 ms
 2  10.1.1.2 (10.1.1.2)  49.929 ms  56.672 ms  56.353 ms
 3  10.1.5.2 (10.1.5.2)  101.788 ms  84.369 ms  60.697 ms
 4  192.168.3.254 (192.168.3.254)  187.048 ms  119.462 ms  82.071 ms
root@box:~# traceroute 192.168.3.1
```

- We start on the Galway PC (192.168.1.1).
- Then go to Athlone Router @ IP 10.1.1.2.
- Then it goes Cork Router @ IP 10.1.5.2.
- And finally we get to the Cork PC @ IP 192.168.3.254.

This route is chosen as it is the route with the lowest OSPF cost.

The link from the Galway Router to the Cork Router is 300 over the chosen connections which all had a cost of 10.

Galway -> Dublin

```
root@box:~# traceroute 192.168.2.254
traceroute to 192.168.2.254 (192.168.2.254), 30 hops max, 38 byte packets
 1  192.168.1.1 (192.168.1.1)  8.866 ms  49.651 ms  31.919 ms
 2  10.1.1.2 (10.1.1.2)  96.322 ms  68.729 ms  67.357 ms
 3  10.1.2.2 (10.1.2.2)  92.683 ms  81.778 ms  89.366 ms
 4  192.168.2.254 (192.168.2.254)  203.645 ms  91.874 ms  124.077 ms
root@box:~#
```

2. Turnoff Athlone

```
round trip min/avg/max = 81.988/121.733/136.111 ms
root@box:~# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=116.411 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=88.948 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=106.747 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=90.921 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=118.619 ms
64 bytes from 192.168.2.254: seq=5 ttl=61 time=136.531 ms
```

```
root@box:~# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=116.411 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=88.948 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=106.747 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=90.921 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=118.619 ms
64 bytes from 192.168.2.254: seq=5 ttl=61 time=136.531 ms
64 bytes from 192.168.2.254: seq=6 ttl=61 time=143.411 ms
64 bytes from 192.168.2.254: seq=7 ttl=61 time=123.311 ms
64 bytes from 192.168.2.254: seq=42 ttl=61 time=97.926 ms
```

First test: 38s, 34 packets lost.

```
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=81.988 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=108.899 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=115.193 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=94.708 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=110.696 ms
```

```
root@box:~# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=81.988 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=108.899 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=115.193 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=94.708 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=110.696 ms
64 bytes from 192.168.2.254: seq=39 ttl=61 time=139.700 ms
64 bytes from 192.168.2.254: seq=40 ttl=61 time=108.771 ms
64 bytes from 192.168.2.254: seq=41 ttl=61 time=135.178 ms
```

Second test: 33s, 34 packets lost.

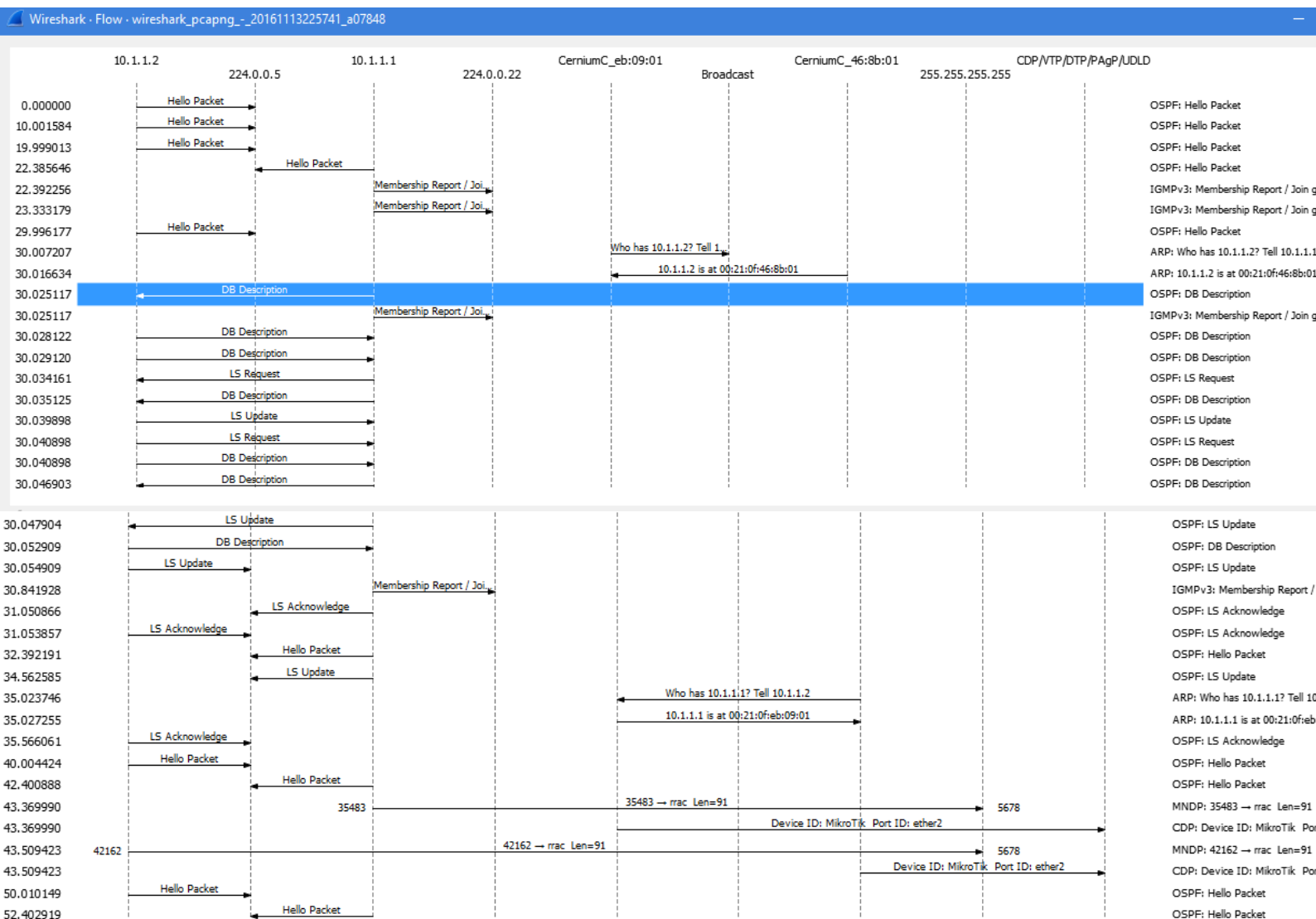
```
root@box:~# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=95.617 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=94.379 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=117.754 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=139.200 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=123.677 ms
64 bytes from 192.168.2.254: seq=5 ttl=61 time=148.132 ms
64 bytes from 192.168.2.254: seq=6 ttl=61 time=106.268 ms
```

```
root@box:~# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254): 56 data bytes
64 bytes from 192.168.2.254: seq=0 ttl=61 time=95.617 ms
64 bytes from 192.168.2.254: seq=1 ttl=61 time=94.379 ms
64 bytes from 192.168.2.254: seq=2 ttl=61 time=117.754 ms
64 bytes from 192.168.2.254: seq=3 ttl=61 time=139.200 ms
64 bytes from 192.168.2.254: seq=4 ttl=61 time=123.677 ms
64 bytes from 192.168.2.254: seq=5 ttl=61 time=148.132 ms
64 bytes from 192.168.2.254: seq=6 ttl=61 time=106.268 ms
64 bytes from 192.168.2.254: seq=43 ttl=61 time=143.160 ms
64 bytes from 192.168.2.254: seq=44 ttl=61 time=111.690 ms
```

Third test: 34s, 36 packets lost.

There was an average of 35 packets lost over around a 35 second time period.

3.



No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	10.1.1.2	224.0.0.5	OSPF	82	Hello Packet

- Hello messages are going from Galway's address and Athlone's address to the router's OSPF multicast address (224.0.0.5). Hello messages are a form of greeting, they allow routers to discover adjacent router on the local links and networks.

18	30.050686	10.1.1.1	10.1.1.2	OSPF	66 DB Description
20	30.086748	10.1.1.2	10.1.1.1	OSPF	66 DB Description
21	30.087725	10.1.1.2	10.1.1.1	OSPF	286 DB Description
22	30.107744	10.1.1.1	10.1.1.2	OSPF	286 DB Description
23	30.121740	10.1.1.2	10.1.1.1	OSPF	66 DB Description

- Database Descriptions are sent from both the Galway address and Athlone address to the other.
- DB Description message contain a description of the system. This will describe the topology of the network so OSPF can be enable.
- Multiple DB Descriptions are being sent here. Communicating larger DB Description requires breaking down the message with the receiver sending acknowledgments.

10.1.1.1	10.1.1.2	OSPF	70 LS Request
----------	----------	------	---------------

- An LS Request is sent from the Galway IP to the Athlone IP.
- LS Request are used to request updated information about a portion of the LSDB from another router.

30.414700	10.1.1.2	224.0.0.5	OSPF	154 LS Update
31.438659	10.1.1.1	224.0.0.5	OSPF	98 LS Acknowledge
31.877243	10.1.1.1	224.0.0.5	OSPF	110 LS Update
32.910122	10.1.1.2	224.0.0.5	OSPF	78 LS Acknowledge

- Updates and Acknowledgments are sent from each address (10.1.1.1 & 10.1.1.2) to the multicast address 224.0.0.5 on the router. OSPF has been fully established.
- The update messages contain updated information about the state of certain links on the LSDB.
- Acknowledgements are a crucial partial of updating the LSDB, and provide reliability to the link-exchange process.

40.634366	10.1.1.1	224.0.0.5	OSPF	82 Hello Packet
50.003957	10.1.1.2	224.0.0.5	OSPF	82 Hello Packet
50.631198	10.1.1.1	224.0.0.5	OSPF	82 Hello Packet

- Hello messages are then sent from each address periodically to check any changes in the network.